

Scientists establish new way to test for drug resistant infections

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The research team are now working with clinicians at York Teaching Hospital NHS Foundation Trust to integrate this modified antibiotic into a rapid diagnostic test for antimicrobial resistance in urinary tract infections. Credit: University of York

Scientists have developed a method to test whether an infection is resistant to common antibiotics.

Beta-lactam [antibiotics](#) (such as penicillin) are one of the most important classes of antibiotics, but resistance to them has grown to such an extent that doctors often avoid prescribing them in favour of stronger drugs.

Scientists from the University of York modified an antibiotic from the beta-lactam family so that it can be attached to a sensor, enabling them to detect the presence of bacteria resistant to treatment.

The new method could lead to clinicians being able to rapidly detect whether an infection is treatable with [common antibiotics](#), reserving stronger alternatives for the patients that need them most.

Antimicrobial resistance (AMR) is a major global threat accelerated by the inappropriate use of antibiotics.

Co-author of the study, Callum Silver, a Ph.D. student from the Department of Electronic Engineering, said: "If we continue to use antibiotics in the way we currently do, we may find ourselves in a situation where we can no longer use antibiotics to treat patients—resulting in millions of deaths per year.

"This study paves the way for the development of tests which will give doctors [important information](#) on the bacteria they are dealing with so that common antibiotics can be used whenever possible. Resistance to new antibiotics can emerge very quickly after they come into use and so we need to reserve them for when they are really needed.

"The discovery may also help to identify and isolate resistant bacteria, reducing the chances of large outbreaks."

One of the major ways in which bacteria become resistant to treatment is through the production of enzymes that can break down [beta-lactam antibiotics](#), rendering them ineffective.

The researchers were able to test for the presence of these resistance enzymes by attaching the modified antibiotic to a sensor surface which enabled them to see whether or not the drug was broken down.

The researchers used multiple techniques to show that the drug is still accessible to the enzyme, meaning the modified antibiotic could be used to develop things like urine tests for AMR bacteria in patients.

Callum Silver added: "The lack of diagnostic techniques to inform doctors whether or not they are dealing with resistant [bacteria](#) contributes to the problem of AMR."

"This modified antibiotic could be applied to a variety of different biosensing devices for use at the point-of-care."

Dr. Steven Johnson, Reader in the University's Department of Electronic Engineering, said: "This important study is the result of a close collaboration between physical, chemical and biological scientists at the University of York and lays the foundation for a new diagnostic test for drug resistant infections.

"We are now working with clinicians at York Teaching Hospital NHS Foundation Trust to integrate this modified antibiotic into a rapid diagnostic [test](#) for antimicrobial resistance in urinary tract infections."

More information: Lisa M. Miller et al, Surface-Bound Antibiotic for the Detection of β -Lactamases, *ACS Applied Materials & Interfaces* (2019). [DOI: 10.1021/acsami.9b05793](https://doi.org/10.1021/acsami.9b05793)

Provided by University of York

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